

CLAIMS

1. An optical device package structure comprising:

an optical device (6);

a lead frame having a mounting portion (5) on
5 which the optical device (6) is mounted and a lead portion
(3) electrically connected to the optical device (6), the
mounting portion (5) having an aperture (5a) through which
light incident on or emitted from the optical device (6)
passes;

10 a wire (9) placed on a side of the lead frame on
which side the optical device (6) is mounted and
electrically connecting the optical device (6) with the
lead portion (3);

a first resin (8) placed on a side opposite from
15 the side of the lead frame on which the optical device (6)
is mounted, the first resin being transmissive to the
light;

a second resin (2) at least part of which is
placed on the side of the lead frame on which the optical
20 device (6) is mounted, the second resin sealing the optical
device (6) and the wire (9) and having a coefficient of
linear expansion lower than that of the first resin; and

a crack prevention structure (8, 21, 22, 31, 32,
81) preventing the first resin from cracking.

2. The optical device package structure as claimed in claim 1, wherein

the crack prevention structure comprises:

5 a bent portion (31) provided at the lead portion (3) of the lead frame and bent toward the side on which the optical device (6) is mounted;

a portion (21) of the second resin located on the side opposite from the side on which the optical device (6) is mounted with respect to the bent portion (31); and

10 an end portion (81) of the first resin put in contact with the portion of the second resin.

3. The optical device package structure as claimed in claim 1, wherein

15 the crack prevention structure comprises:

a recess portion (32) provided at the lead portion (3) of the lead frame and having a concavity on the side opposite from the side on which the optical device (6) is mounted;

20 a portion (22) of the second resin located inside the recess portion (32); and

an end portion (81) of the first resin put in contact with the portion (22) of the second resin.

4. The optical device package structure as claimed in claim 1, wherein

the crack prevention structure comprises:

5 a bent portion (31) provided at the lead portion (3) of the lead frame and bent toward the side on which the optical device (6) is mounted; and

an end portion (81) of the first resin having an end surface (83) that is aligned with an edge of the bent portion.

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5. The optical device package structure as claimed in claim 4, wherein

the end surface (83) of the end portion of the first resin is roughly flush with a surface of the bent portion (31) located on the side opposite from the side on which the optical device is mounted.

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6. The optical device package structure as claimed in claim 1, wherein

20 the second resin (2) is formed by transfer molding.

7. The optical device package structure as claimed in claim 1, wherein

the second resin (2) contains no mold release agent.

8. The optical device package structure as claimed
5 in claim 1, wherein

the first resin (8) contains filler that reduces the coefficient of linear expansion of the first resin.

9. The optical device package structure as claimed
10 in claim 1, wherein

the crack prevention structure comprises the first resin (8),

the first resin (8) has a lens portion (8a) that collects light incident on or emitted from the optical
15 device and a base portion (8b) that is continuous to the lens portion (8a), and

the base portion (8b) has a thickness of not greater than 0.5 mm.

20 10. The optical device package structure as claimed in claim 1, wherein

the crack prevention structure comprises the first resin (8), and

the first resin (8) has a lens portion (8a) that
25 collects light incident on or emitted from the optical

device (6) and a base portion (8b) continuous to the lens portion (8a) and has an area smaller than an area of the mounting portion (5) of the lead frame when viewed from a direction of emission or incidence of the light.

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11. The optical device package structure as claimed in claim 1, wherein

the crack prevention structure comprises the first resin (8),

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the first resin (8) has a lens portion (8a) that collects light incident on or emitted from the optical device (6) and a base portion (8b) continuous to the lens portion (8a) and has an area smaller than an area of the mounting portion (5) of the lead frame when viewed from a direction of emission or incidence of the light, and

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the base portion (8b) has a thickness smaller than a thickness of the lens portion (8a).

12. The optical device package structure as claimed in claim 10 or 11, wherein

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the second resin (2) has a part placed on the side opposite from the side of the lead frame on which the optical device (6) is mounted, and the part (2a) of the second resin is placed at least in a part of a portion

other than the portion of the lead frame where the first resin (8) is placed.

13. The optical device package structure as claimed
5 in claim 1, wherein

the crack prevention structure comprises the first resin (8), and

the first resin (8) has a lens portion (8a) that collects light incident on or emitted from the optical
10 device (6) and a base portion (8b) continuous to the lens portion (8a) and is bonded to at least the lead frame with an adhesive material (10).

14. The optical device package structure as claimed
15 in claim 13, wherein

the adhesive material (10) contains a resin that has a glass transition point lower than a lowest storage temperature.

20 15. The optical device package structure as claimed in claim 13, wherein

the adhesive material (10) contains a resin that has a curing point of not lower than a lowest storage temperature and not higher than a highest storage
25 temperature.

16. The optical device package structure as claimed in claim 1, wherein

the crack prevention structure comprises the
5 first resin (8), and

the first resin (8) has a plurality of lens portions (8a) that collect light incident on or emitted from the optical device (6) and a plurality of base portions (8b) continuous to the respective lens portions
10 (8a), and the plurality of combined lens portions (8a) and base portions (8b) are mutually separated.